AKD4708-A
AK4708 Evaluation Board Rev.0

GENERAL DESCRIPTION

AKD4708 is an evaluation board for quickly evaluating the AK4708, AV SCART switch. Evaluation requires audio/video analog analyzers/generators and a power supply.

■ **Ordering guide**

AKD4708-A --- AK4708 Evaluation Board
(Cable for connecting with printer port of IBM-AT, compatible PC and control software are packed with this.)

FUNCTION

- **BNC connectors for analog audio input/output**
- **BNC connectors for analog video input/output**
- **10pin header for serial control interface**

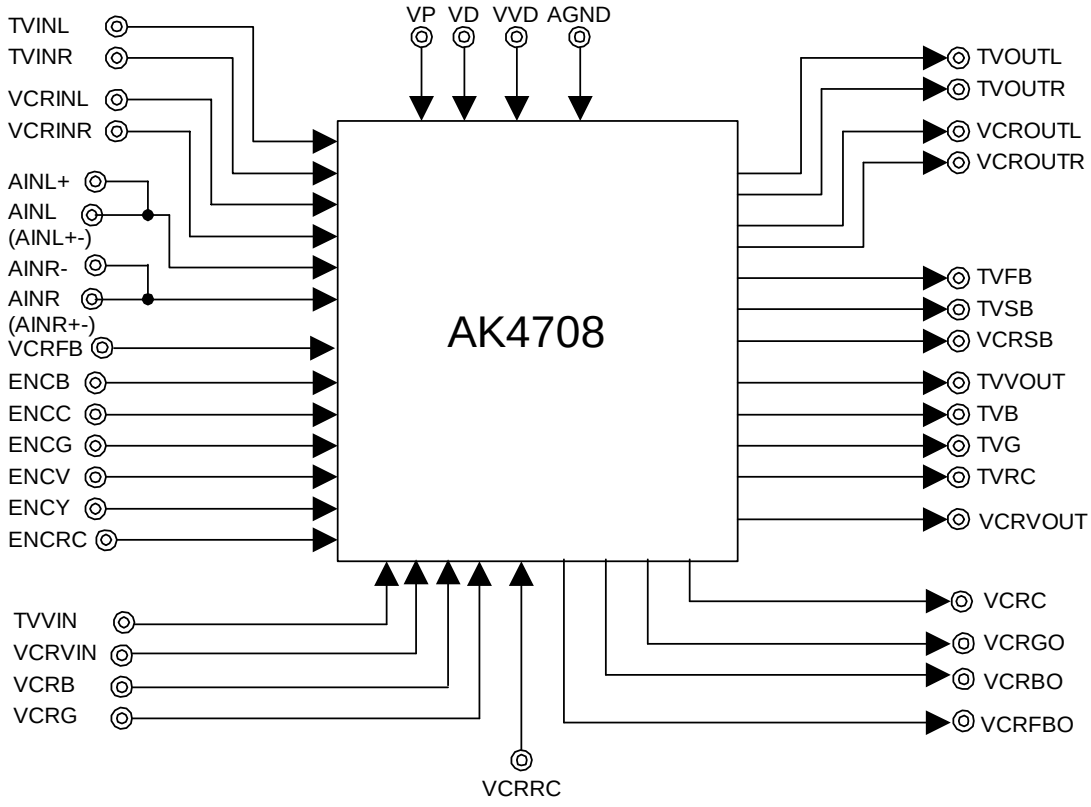


Figure 1. AKD4708 Block Diagram

* Circuit diagram and PCB layout are attached at the end of this manual.

EVALUATION BOARD MANUAL

■ Operation sequence

1) Set up the power supply lines.

[VP]	(Orange)	= 11.4 ~ 12.6V (typ. 12V, for VP pin)
[VD]	(Red)	= 4.75 ~ 5.25V (typ. 5.0V, for VD pin)
[VVD]	(Red)	= 4.75 ~ 5.25V (typ. 5.0V, for VVD1 pin, VVD2 pin)
[VCC]	(Red)	= 5.0V (for digital logic)
[AGND]	(Black)	= 0V (for analog ground: VSS, VVSS)
[DGND]	(Black)	= 0V (for digital ground)

Each supply line should be distributed from the power supply unit.

2) Set-up jumper pins. (See the followings.)

3) Power on.
The AK4708 should be reset once bringing SW1 "L" upon power-up.

■ Jumper pins set up

[JP1] (GND): Analog ground and Digital ground
OPEN: Separated
SHORT: Common. (The connector "DGND" can be open.) <Default>

[JP2] (VD): Regulator +5V or VD connector
OPEN: VD pin is supplied from VD connector.
SHORT: VD pin is supplied to regulator +5V. (The connector "VD" can be open.) <Default>

[JP3] (VVD): VD connector or VVD connector
OPEN: VVD1 and VVD2 pins are supplied from VVD connector.
SHORT: VVD1 and VVD2 pins are supplied from VD connector.
(The connector "VVD" can be open.) <Default>

[JP4] (VCC): VVD connector or VCC connector
OPEN: Logic voltage is supplied from VCC connector.
SHORT: Logic voltage is supplied form VVD connector. (The connector "VCC" can be open.) <Default>

The regulator can be supplied 5.0V to all circuits by shorting JP2, JP3 and JP4 and supplying 12V to VP connector.

[JP6] (VCRRC): VCRRC pin input select
I: J16 (VCRRC) <Default>
I/O: J36 (VCRCOUT)

[JP7] (VCRG): VCRG pin input select
I: J13 (VCRG) <Default>
I/O: J37 (VCRGOUT)

[JP8] (VCRB): VCRB pin input select
I: J9 (VCRB) <Default>
I/O: J38 (VCRBOUT)

[JP9] (VCRFB): VCRFB pin input select
I: J10 (VCRFB) <Default>
I/O: J39 (VCRFBOUT)

[JP10] (GND): AINL- pin input select
OPEN: J14 (AINL): 3pin <Default>
SHORT: GND (Not use)

[JP11] (GND): AINR- pin input select
OPEN: J18 (AINR): 3pin <Default>
SHORT: GND (Not use)

■ The function of the toggle SW

[SW1] (PDN): Resets the AK4708. Keep "H" during normal operation.

■ The indication content for INT pin

Changes of the 08H status can be monitored via the TEST1 (INT). The INT pin is the open drain output and goes "L" for 2μs (typ.) when the status of 08H is changed.

■ Serial Control

The AK4708 can be controlled via the printer port (parallel port) of IBM-AT compatible PC. Connect PORT1 (CTRL) with PC by 10-line flat cable packed with the AKD4708-A. The control software packed with this evaluation board supports I^2C control only.

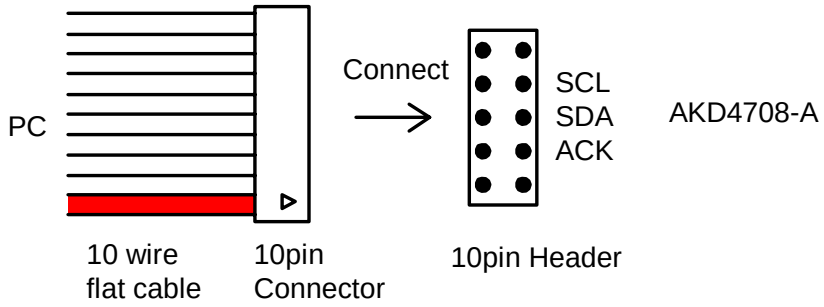


Figure 2. Connect of 10-line flat cable

■ Analog Input/Output List

		Signal Name	Note
Audio	Input	J1 (TVINL), J4 (TVINR), J7 (VCRINL), J11 (VCRINR)	Max. 2Vrms
		J14 (AINL+, AINL-), J18 (AINR+, AINR-), J34 (AINL–), J35 (AINR–)	Max. 2Vrms
	Output	J24 (TVOUTL), J27 (TVOUTR), J30 (VCROUTL), J32 (VCROUTR)	Max. 2.15Vrms
Video	Input	J2 (ENCB), J5 (ENCC), J8 (ENCG), J12 (ENCV), J15 (ENCY) J17 (ENCRC), J3 (TVVIN), J6 (VCRVIN), J9 (VCRB) J13 (VCRG), J16 (VCRRC)	Max. 1.5Vpp
	Output	J19 (TVVOUT), J20 (TVB), J23 (TVG), J26 (TVRC) J29 (VCRVOUT), Jxx (VCRC), Jxx (VCRGO), Jxx (VCRBO)	Max. 3.0Vpp
Slow Blanking	Input	J25 (VCRSB)	Max. VP+0.3V
	Output	J22 (TVSB), J25 (VCRSB)	Max. VP
Fast Blanking	Input	J10 (VCRFB)	Max. VVD1+0.3V
	Output	J28 (TVFB), Jxx (VCRFBO)	Max. VVD2

Table 1. Analog Input/Output List

CONTROL SOFTWARE MANUAL

■ Set-up of evaluation board and control software

1. Set up the AKD4708-A according to previous term.

2. Connect IBM-AT compatible PC with AKD4708-A by 10-line type flat cable (packed with AKD4708-A). Take care of the direction of 10pin header. (Please install the driver in the CD-ROM when this control software is used on Windows 2000/XP. Please refer “Installation Manual of Control Software Driver by AKM device control software”. In case of Windows95/98/ME, this installation is not needed. This control software does not operate on Windows NT.)

3. Insert the CD-ROM labeled “AK4708 Evaluation Kit” into the CD-ROM drive.

4. Access the CD-ROM drive and double-click the icon of “akd4708-a.exe” to set up the control program.

5. Then please evaluate according to the follows.

■ Operation flow

Keep the following flow.

1. Set up the control program according to explanation above.
2. Click “Port Reset” button.
3. Click “Write default” button

■ Explanation of each buttons

1. [Port Reset]: Set up the USB interface board (AKDUSBIF-A) when using the board.
2. [Write default]: Initialize the register of AK4708.
3. [All Write]: Write all registers that is currently displayed.
4. [Function1]: Dialog to write data by keyboard operation.
5. [Function2]: Dialog to write data by keyboard operation.
6. [Function3]: The sequence of register setting can be set and executed.
7. [Function4]: The sequence that is created on [Function3] can be assigned to buttons and executed.
8. [Function5]: The register setting that is created by [SAVE] function on main window can be assigned to buttons and executed.
9. [SAVE]: Save the current register setting.
10. [OPEN]: Write the saved values to all register.
11. [Write]: Dialog to write data by mouse operation.

■ Indication of data

Input data is indicated on the register map. Red letter indicates “H” or “1” and blue one indicates “L” or “0”. Blank is the part that is not defined in the datasheet.

■ Explanation of each dialog

1. [Write Dialog]: Dialog to write data by mouse operation

There are dialogs corresponding to each register.

Click the [Write] button corresponding to each register to set up the dialog. If you check the check box, data becomes "H" or "1". If not, "L" or "0".

If you want to write the input data to the AK4708, click [OK] button. If not, click [Cancel] button.

2. [Function1 Dialog] : Dialog to write data by keyboard operation

Address Box: Input registers address in 2 figures of hexadecimal.
Data Box: Input registers data in 2 figures of hexadecimal.

If you want to write the input data to the AK4708, click [OK] button. If not, click [Cancel] button.

3. [Function2 Dialog] : Dialog to evaluate DATT

There are dialogs corresponding to register of 02h,0Dh.

Address Box: Input registers address in 2 figures of hexadecimal.
Start Data Box: Input starts data in 2 figures of hexadecimal.
End Data Box: Input end data in 2 figures of hexadecimal.
Interval Box: Data is written to AK4708 by this interval.
Step Box: Data changes by this step.
Mode Select Box:

If you check this check box, data reaches end data, and returns to start data.
[Example] Start Data = 00, End Data = 09
Data flow: 00 01 02 03 04 05 06 07 08 09 09 08 07 06 05 04 03 02 01 00

If you do not check this check box, data reaches end data, but does not return to start data.
[Example] Start Data = 00, End Data = 09
Data flow: 00 01 02 03 04 05 06 07 08 09

If you want to write the input data to the AK4708, click [OK] button. If not, click [Cancel] button.

4. [SAVE] and [OPEN]

4-1. [SAVE]

All of current register setting values displayed on the main window are saved to the file. The extension of file name is “akr”.

<Operation flow>
(1) Click [SAVE] Button.
(2) Set the file name and click [SAVE] Button. The extension of file name is “akr”.

4-2. [OPEN]

The register setting values saved by [SAVE] are written to the AK4708. The file type is the same as [SAVE].

<Operation flow>
(1) Click [OPEN] Button.
(2) Select the file (*.akr) and Click [OPEN] Button.

5. [Function3 Dialog]

The sequence of register setting can be set and executed.

(1) Click [F3] Button. The following is displayed.

(2) Set the control sequence.
Set the address, Data and Interval time. Set “-1” to the address of the step where the sequence should be paused.

(3) Click [START] button. Then this sequence is executed.

The sequence is paused at the step of Interval="-1". Click [START] button, the sequence restarts from the paused step.

This sequence can be saved and opened by [SAVE] and [OPEN] button on the Function3 window. The extension of file name is “aks”.

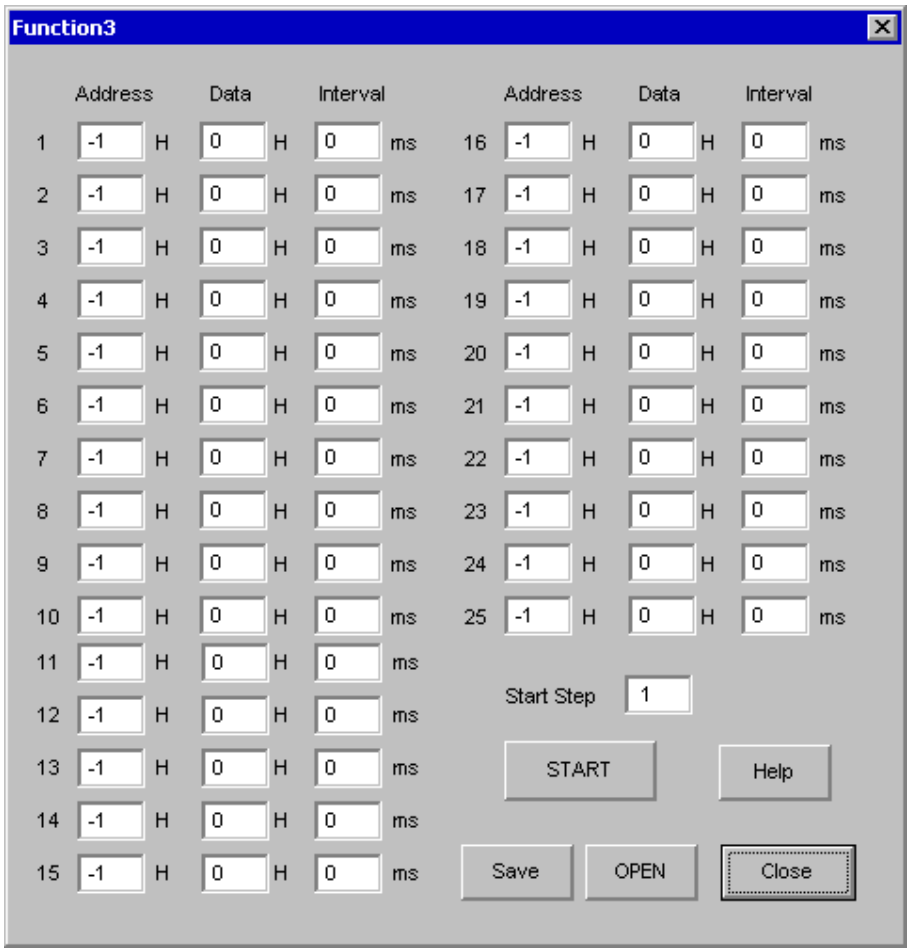


Figure 1. Window of [F3]

6. [Function4 Dialog]

The sequence file (*.aks) saved by [Function3] can be listed up to 10 files, assigned to buttons and then executed. When [F4] button is clicked, the window as shown in Figure 2 opens.

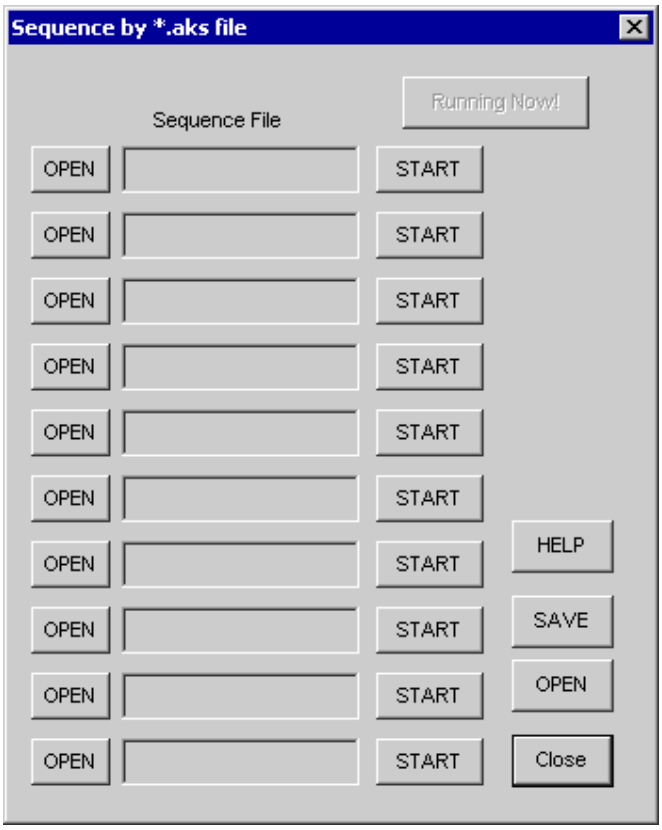


Figure 2. [F4] window

6-1. [OPEN] buttons on left side and [START] buttons

(1) Click [OPEN] button and select the sequence file (*.aks) saved by [Function3].

The sequence file name is displayed as shown in Figure 3. (In case that the selected sequence file name is "DAC_Stereo_ON.aks")

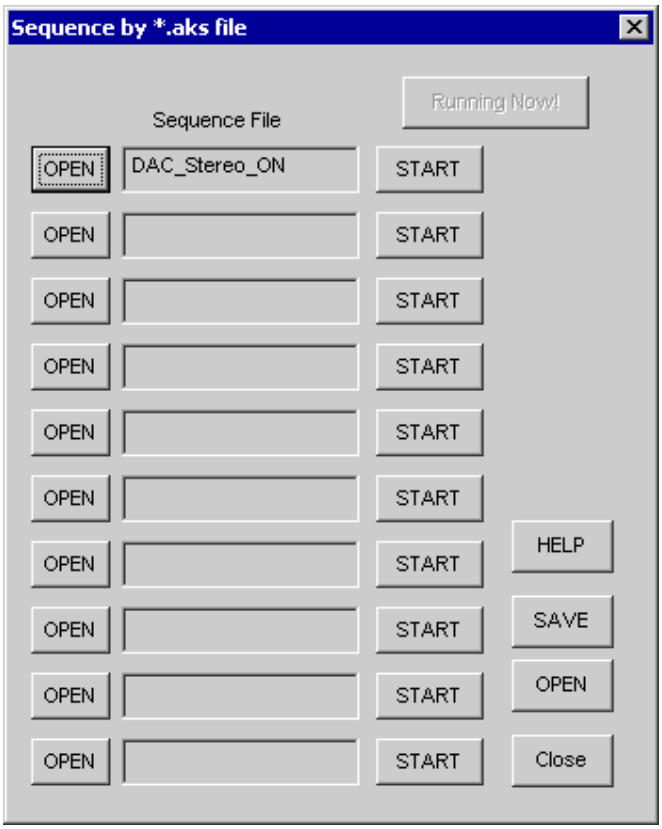


Figure 3. [F4] window(2)

(2) Click [START] button, then the sequence is executed.

6-2. [SAVE] and [OPEN] buttons on right side

[SAVE] : The name assign of sequence file displayed on [Function4] window can be saved to the file. The file name is "*.ak4".

[OPEN] : The name assign of sequence file(*.ak4) saved by [SAVE] is loaded.

6-3. Note

(1) This function doesn't support the pause function of sequence function.

(2) All files used by [SAVE] and [OPEN] function on right side need to be in the same folder.

(3) When the sequence is changed in [Function3], the sequence file (*.aks) should be loaded again in order to reflect the change.

7. [Function5 Dialog]

The register setting file(*.akr) saved by [SAVE] function on main window can be listed up to 10 files, assigned to buttons and then executed. When [F5] button is clicked, the window as shown in Figure 4 opens.

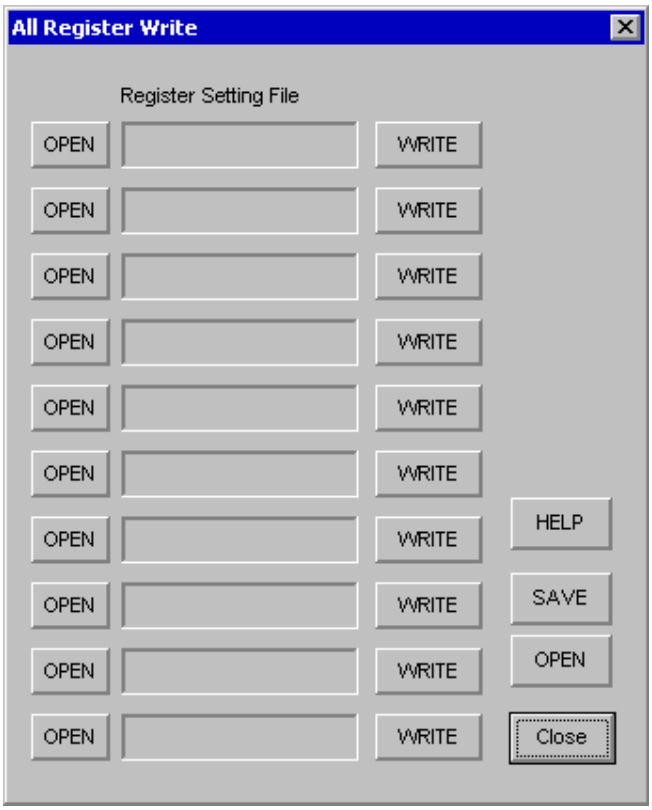


Figure 4. [F5] window

7-1. [OPEN] buttons on left side and [WRITE] button

(1) Click [OPEN] button and select the register setting file (*.akr).

The register setting file name is displayed as shown in Figure 5. (In case that the selected file name is "DAC_Output.akr")

(2) Click [WRITE] button, then the register setting is executed.

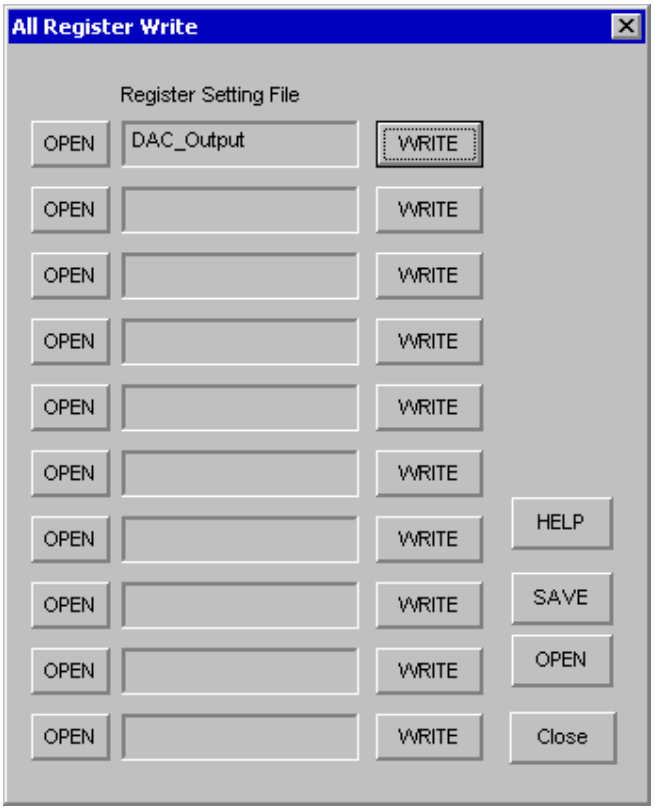


Figure 5. [F5] windows(2)

7-2. [SAVE] and [OPEN] buttons on right side

[SAVE] : The name assign of register setting file displayed on [Function5] window can be saved to the file. The file name is "*.ak5".
[OPEN] : The name assign of register setting file(*.ak5) saved by [SAVE] is loaded.

7-3. Note

(1) All files used by [SAVE] and [OPEN] function on right side need to be in the same folder.

(2) When the register setting is changed by [SAVE] Button on the main window, the register setting file (*.akr) should be loaded again in order to reflect the change.

MEASUREMENT RESULTS

■ Audio

[Measurement condition]

- Measurement unit: Audio Precision SYS-2722
- BW : 20Hz~20kHz
- Power Supply : VP=12V, VD=5V, VDD1=5V, VDD2=5V
- Interface : Input: Cannon, Output: BNC
- Temperature : Room
- Volume#0 Gain : 0dB
- Measurement signal line path: AINL/AINR → Volume#0 → TVOUTL/TVOUTR

Parameter	Input signal	Measurement filter	Results Lch [dB]	Results Rch [dB]
S/(N+D) (At 2Vrms Output)	1kHz, 0dBFS	20kLPF	95.2	95.2
DR	1kHz, -60dBFS	22kLPF, A-weighted	97.6	97.6
S/N	"no-input	22kLPF, A-weighted	97.6	97.6

Plots

Figure 1-1. FFT (1kHz, 0dBFS input) at 2Vrms output
Figure 1-2. FFT (1kHz, -60dBFS input)
Figure 1-3. FFT (Noise floor)
Figure 1-4. THD+N vs. Input Level (fin=1kHz)
Figure 1-5. THD+N vs. fin (Input Level=0dBFS)
Figure 1-6. Linearity (fin=1kHz)
Figure 1-7. Frequency Response (Input Level=0dBFS)
Figure 1-8. Crosstalk (Input Level=0dBFS)

■ Video

[Measurement condition]

- Signal Generator : Sony Tectonics TG2000
- Measurement unit: Sony Tectonics VM700T
- Power Supply : VP=12V, VD=5V, VDD1=5V, VDD2=5V
- Interface : Input: BNC, Output: BNC
- Temperature : Room
- Measurement signal line path: S/N: ENCV → TVVOUT
  Y/C Crosstalk: ENCV → TVVOUT, ENCRC → TVRC
  DG, DP: ENCV → TVVOUT

Parameter	Input Signal	Measurement Filter	Results	Unit
S/N	0% Flat Field	BW=15kHz to 5MHz Filter=Uni-Weighted	72.1	dB
Y/C Crosstalk (Measured at TVVOUT)	100% Red Field (Y→ENCV, C→ENCRC)	BW=15kHz to Full	-45.0 (Note1)	dB
DG	Modulated Lamp		Min: -0.06 Max: 0.22	%
DP	Modulated Lamp		Min: -0.01 Max: 0.64	deg.

Plots

Figure 2-1. Noise spectrum (Input=0% Flat Field, BW=15kHz to 5MHz, Filter=Uni-Weighted)
Figure 2-2. Y/C Crosstalk (Measured at TVVOUT, Input= 100% Red, ENCV=Y, ENCRC=C), BW=15kHz to Full)
Figure 2-3. DG, DP (Input= Modulated Lamp)

(Note1) Y/C Crosstalk: Reference Measurement: Results: 1.7dB (p-p)
Composite signal→ENCV, no input→ENCRC, TVRC is terminated by 75Ohm.
Y/C Crosstalk: Measurement: Results: -43.3dB (p-p)
Y→ENCV, C→ENCRC, TVRC is terminated by 75Ohm.
Y/C Crosstalk calculation: -43.3dB (p-p) - 1.7dB (p-p) = -45.0dB (p-p)

Plots (Audio)

AK4708 AINL/AINR → TVOUTL/TVOUTR: FFT: fin=1KHz, Input Level=0dB

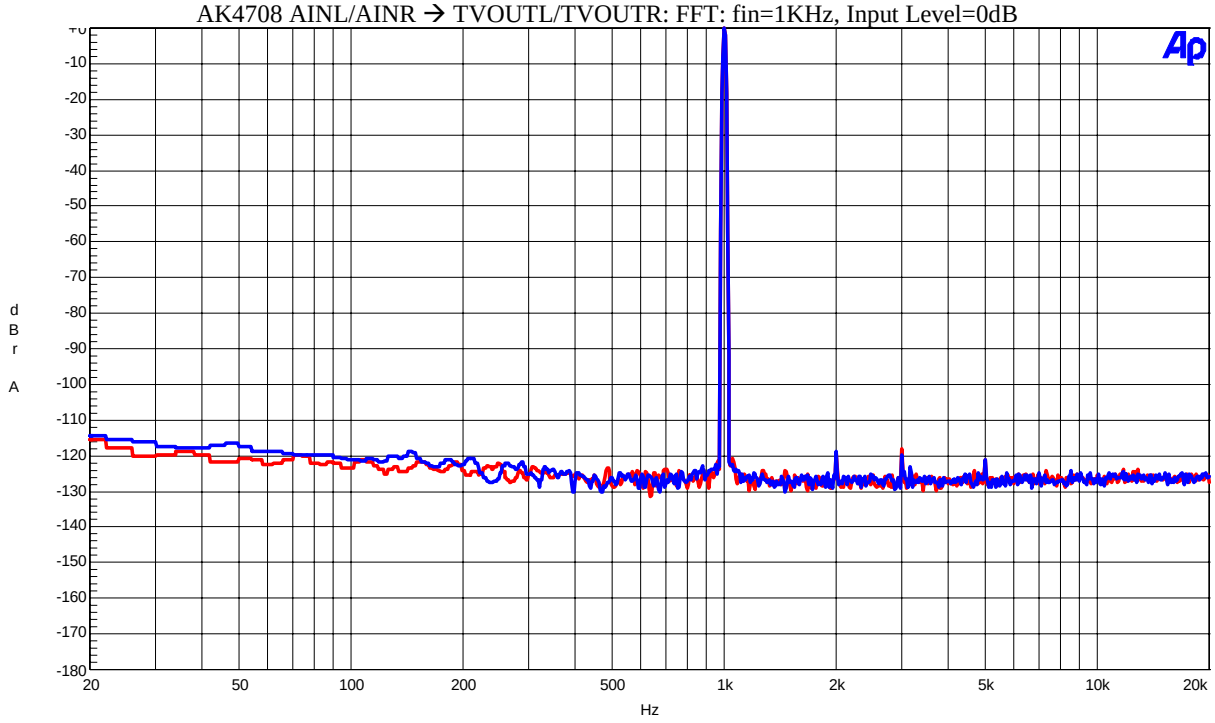


Figure1-1. FFT (fin=1kHz, Input Level=0dBFS)

AK4708 AINL/AINR → TVOUTL/TVOUTR: FFT: fin=1KHz, Input Level=-60dB

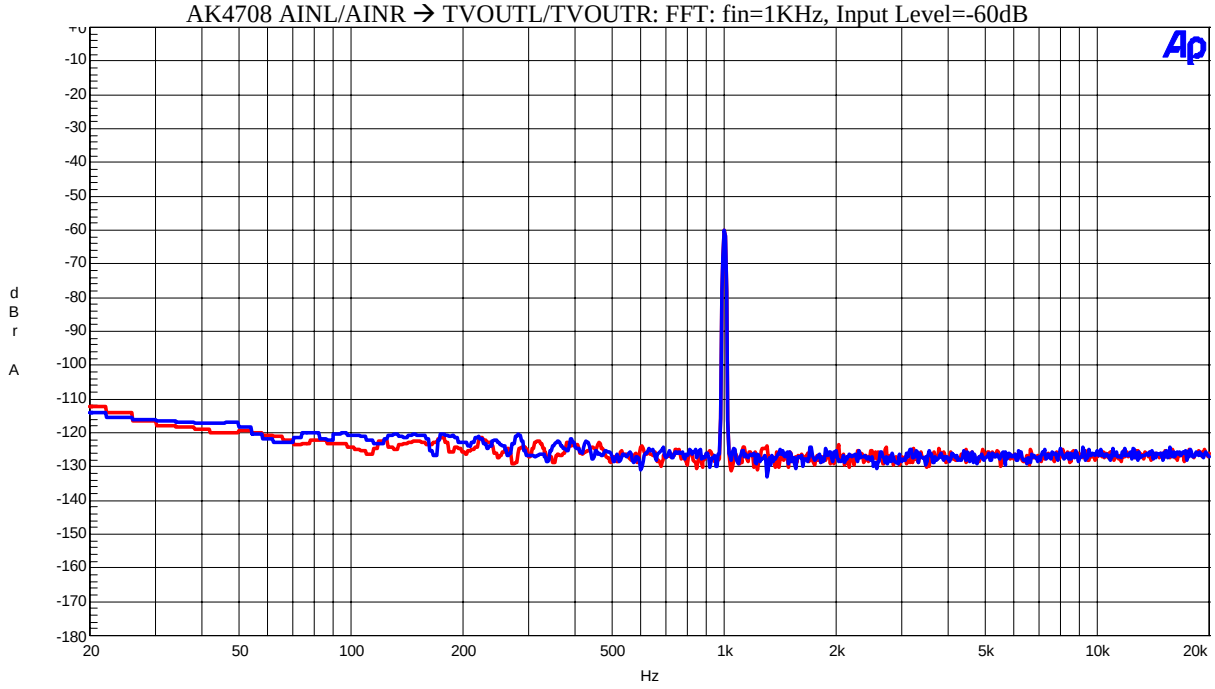


Figure-1-2. FFT (fin=1kHz Input Level=-60dBFS)

AK4708 AINL/AINR → TVOUTL/TVOUTR: FFT: No-input

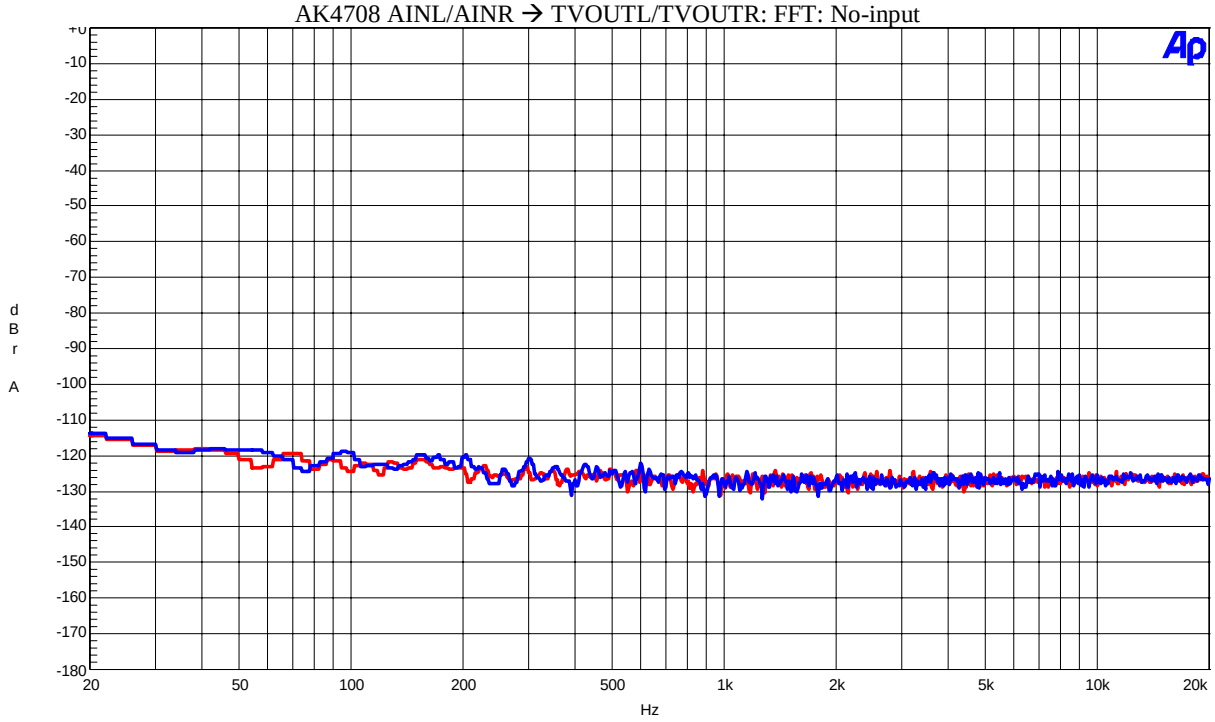


Figure1-3. FFT (Noise Floor)

AK4708 AINL/AINR → TVOUTL/TVOUTR: THD+N Amplitude vs Input Amplitude: fin=1KHz

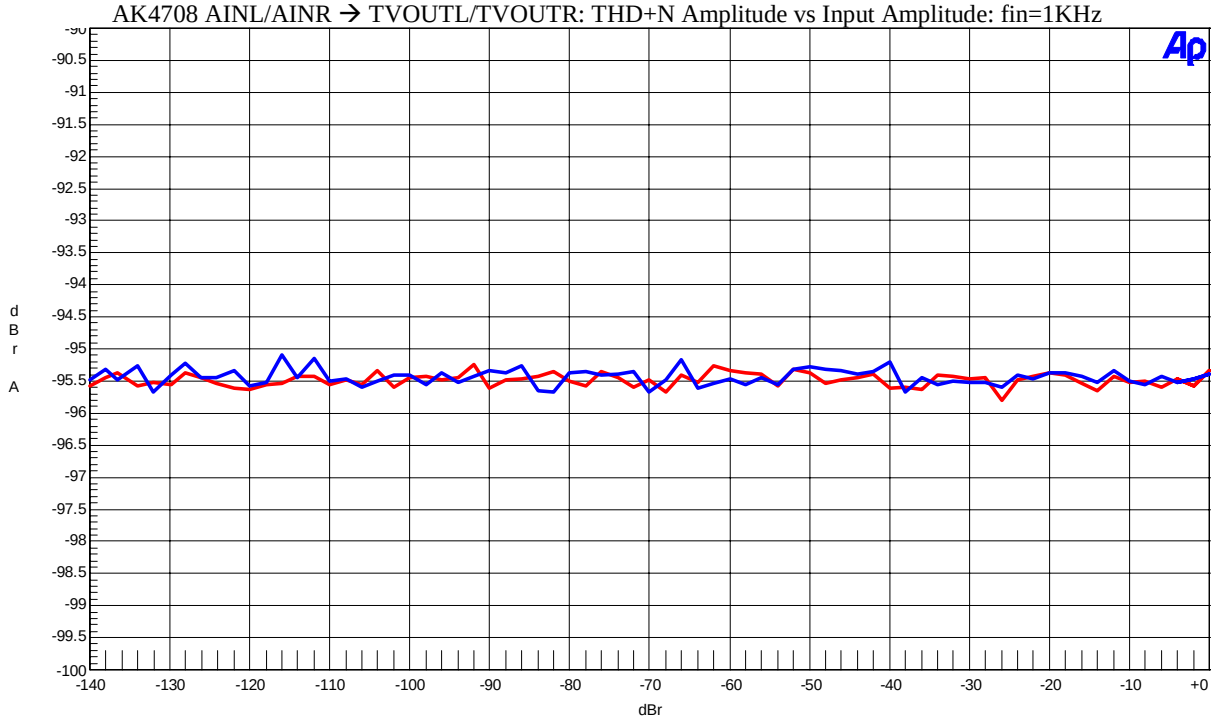


Figure1-4. THD+N vs. Input level (fin=1kHz)

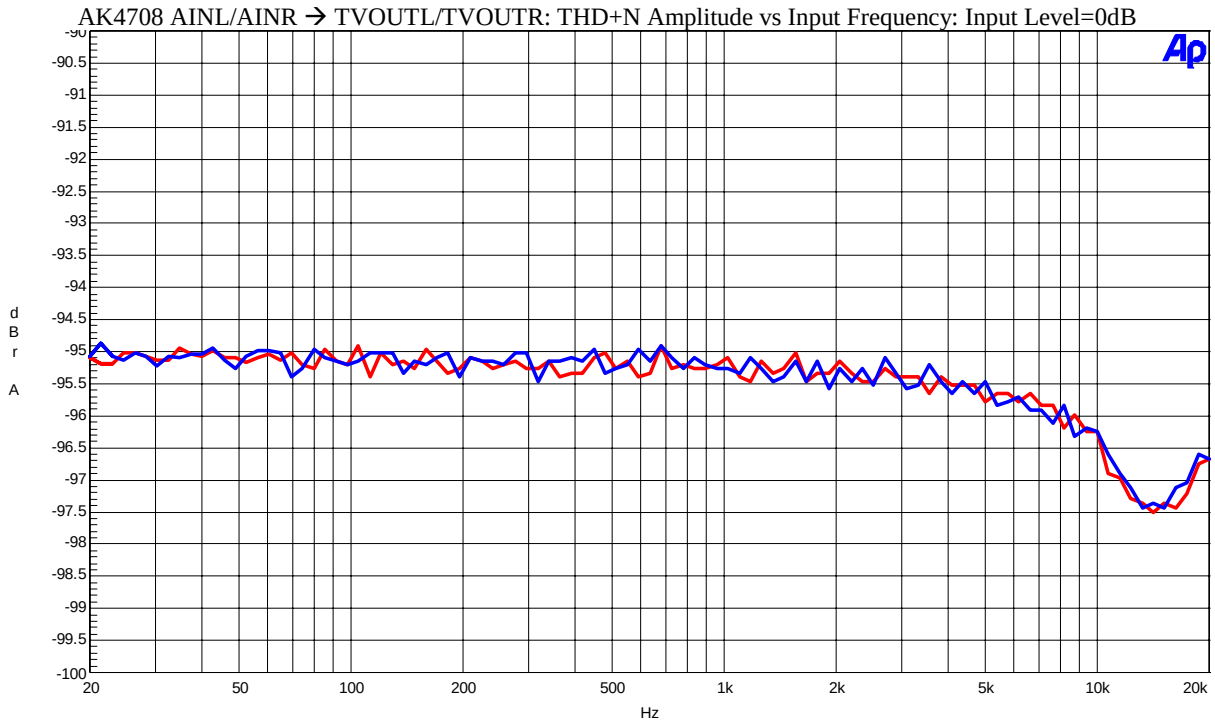


Figure1-5. THD+N vs. Input Frequency (Input level=0dBFS)

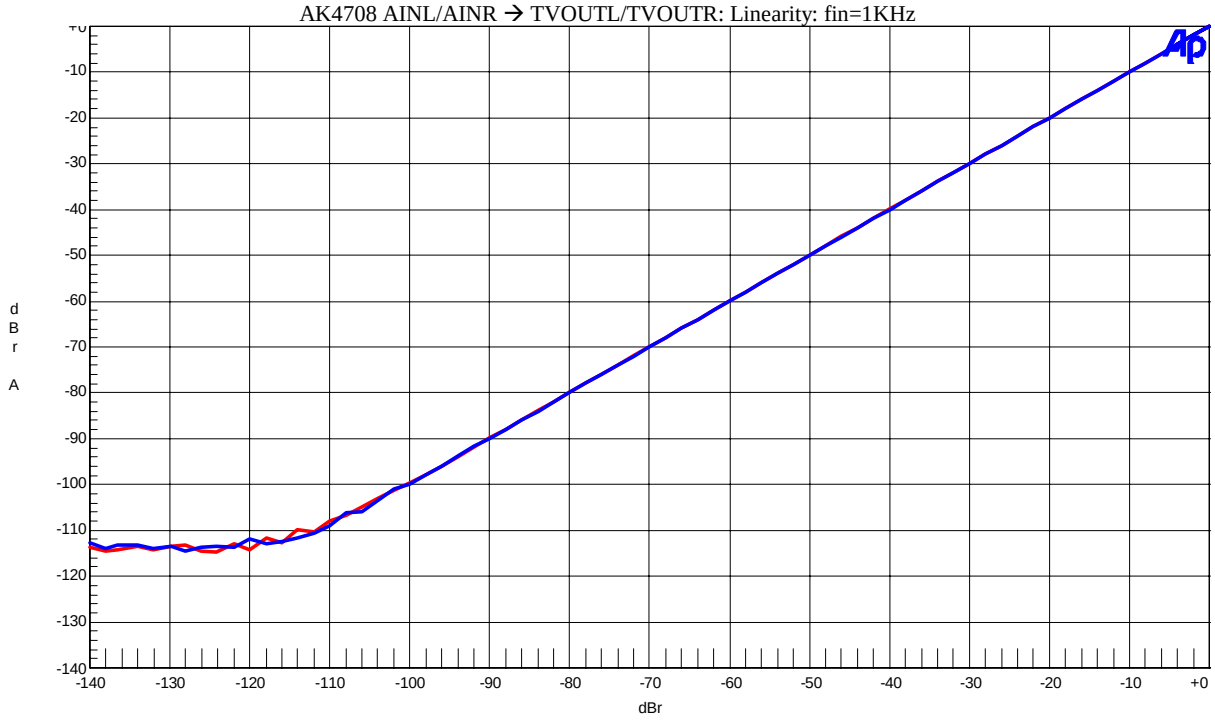


Figure1-6.Linearity (fin=1kHz)

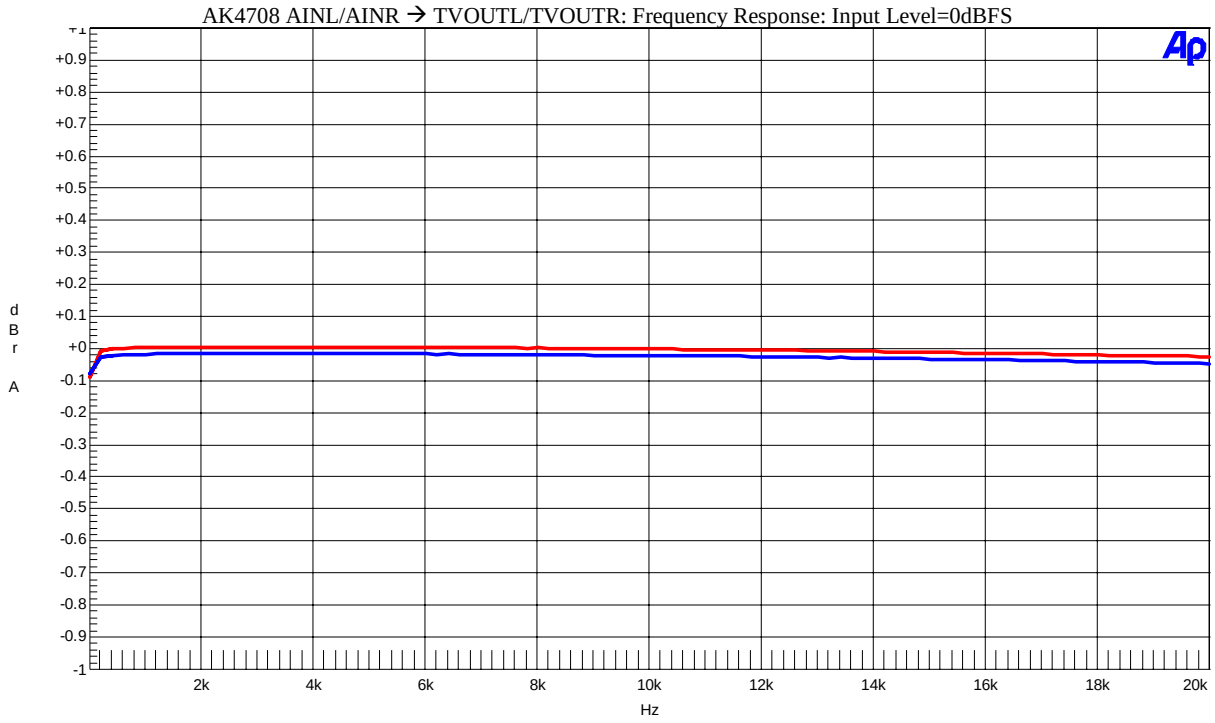


Figure1-7. Frequency Response (Input level=0dBFS)

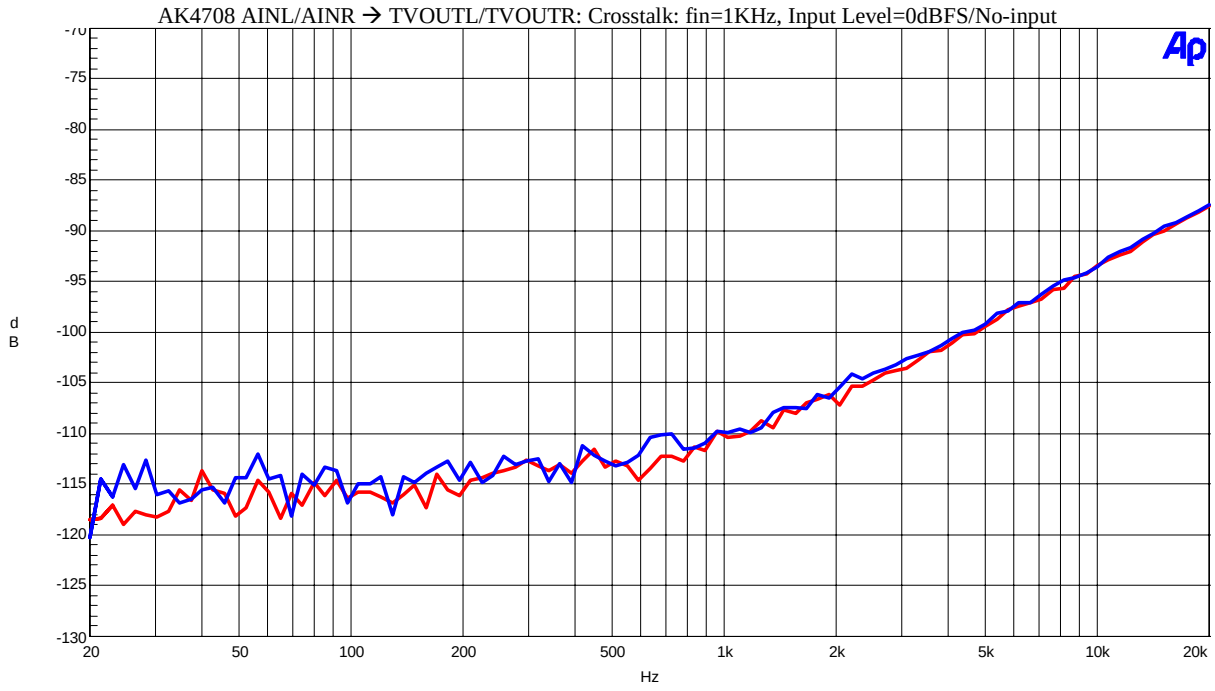


Figure1-8. Crosstalk (Input level=0dBFS)

Plots(Video)

AK4708 ENCV → TVVOUT: S/N: Input Signal=0% Flat Field, BW=15kHz to 5MHz, Filter=Uni-Weighted

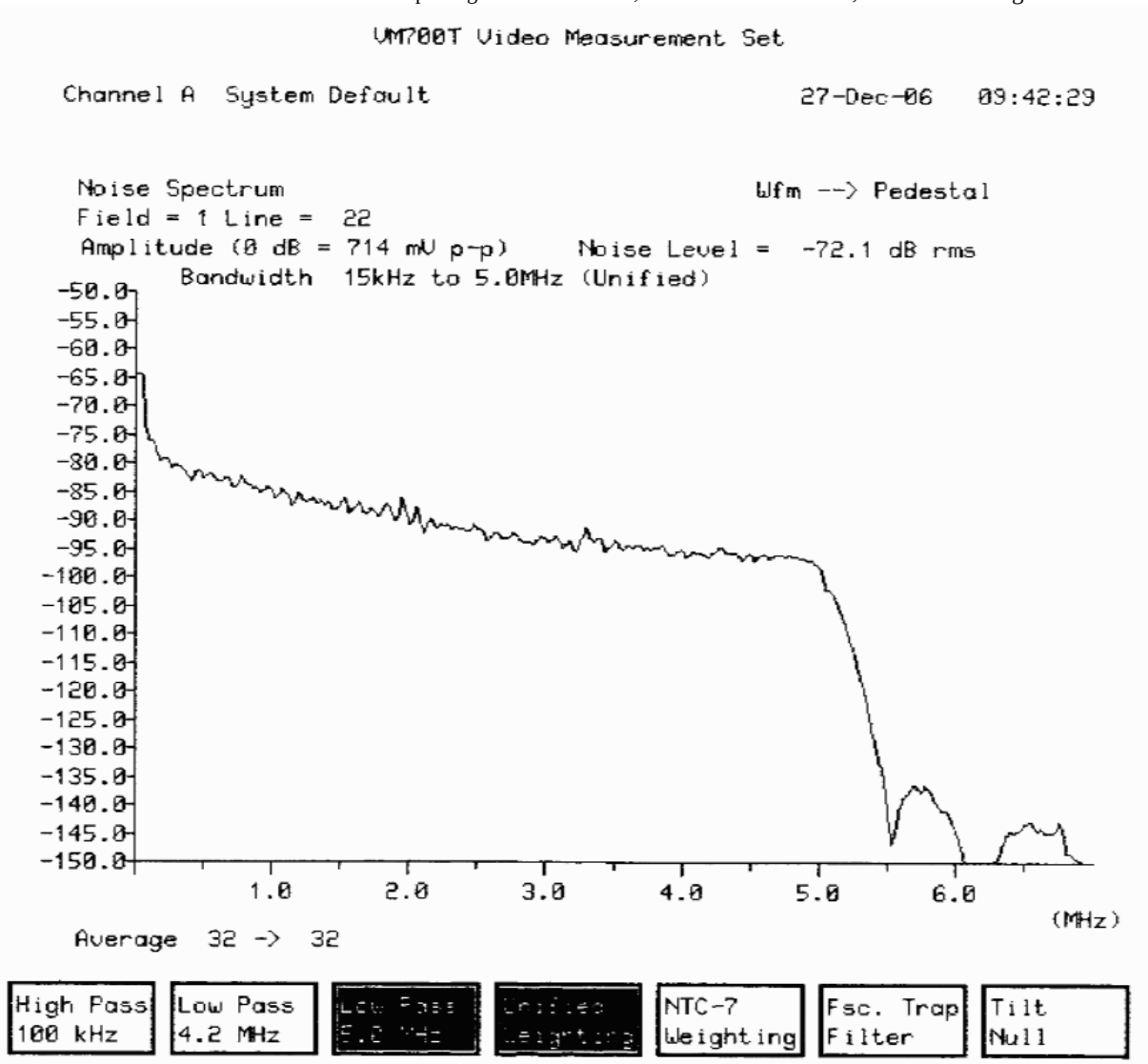


Figure 2-1. Noise spectrum (Input=0% Flat Field, BW=15kHz to 5MHz, Filter=Uni-Weighted)

AK4708 ENCV → TVVOUT/ENCRC→TVRC: Y/C Crosstalk: Input Signal=100% Red Field,
Y→ENCV, C→ENCRC, BW=15kHz to Full

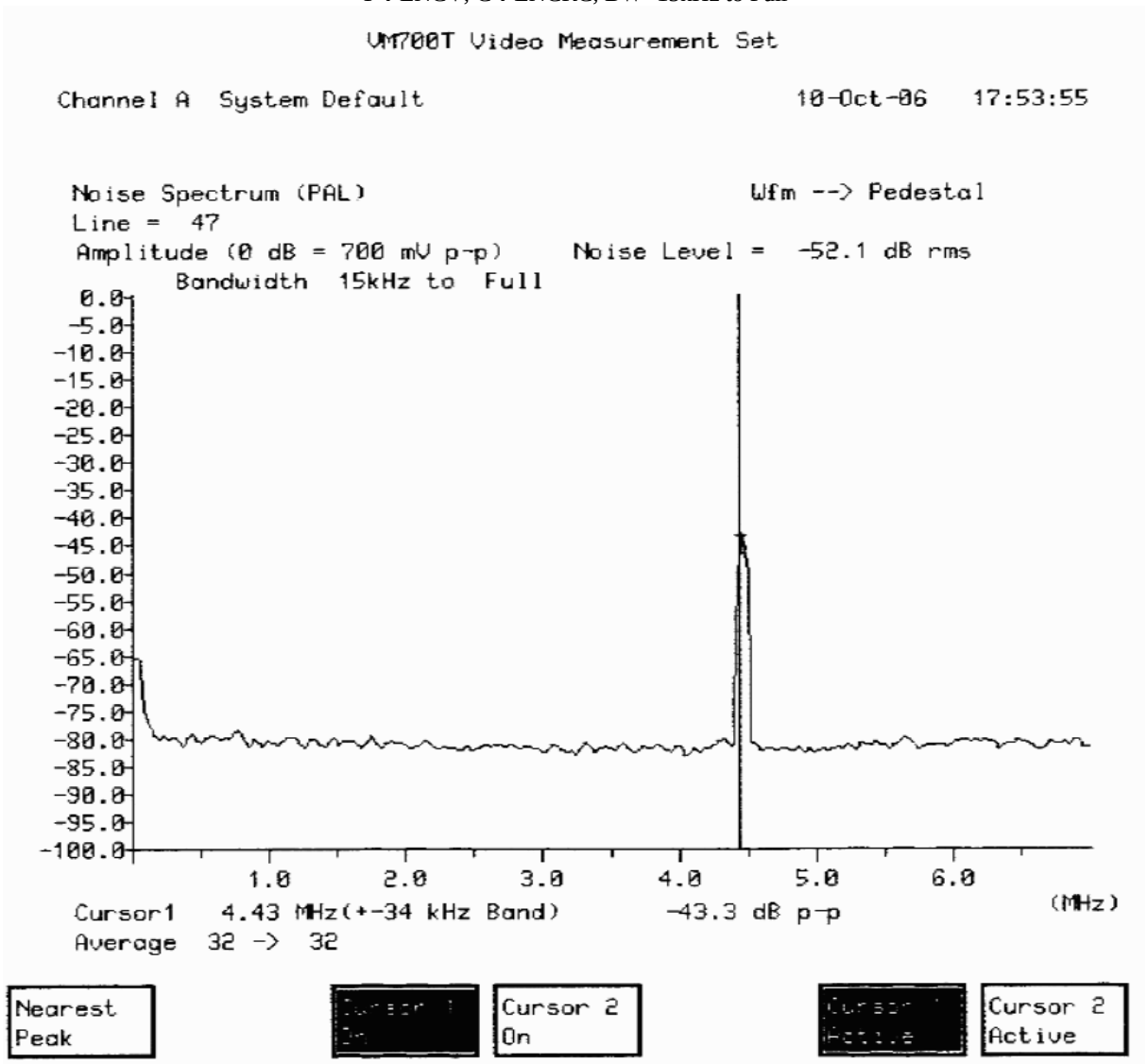


Figure 2-2 Crosstalk (Measured at TVVOUT, Input= 100% Red Field, Y→ENCV, C→ENCRC, BW=15kHz to Full)

AK4708 ENCV → TVVOUT: DG, DP: Input Signal=Modulated Ramp

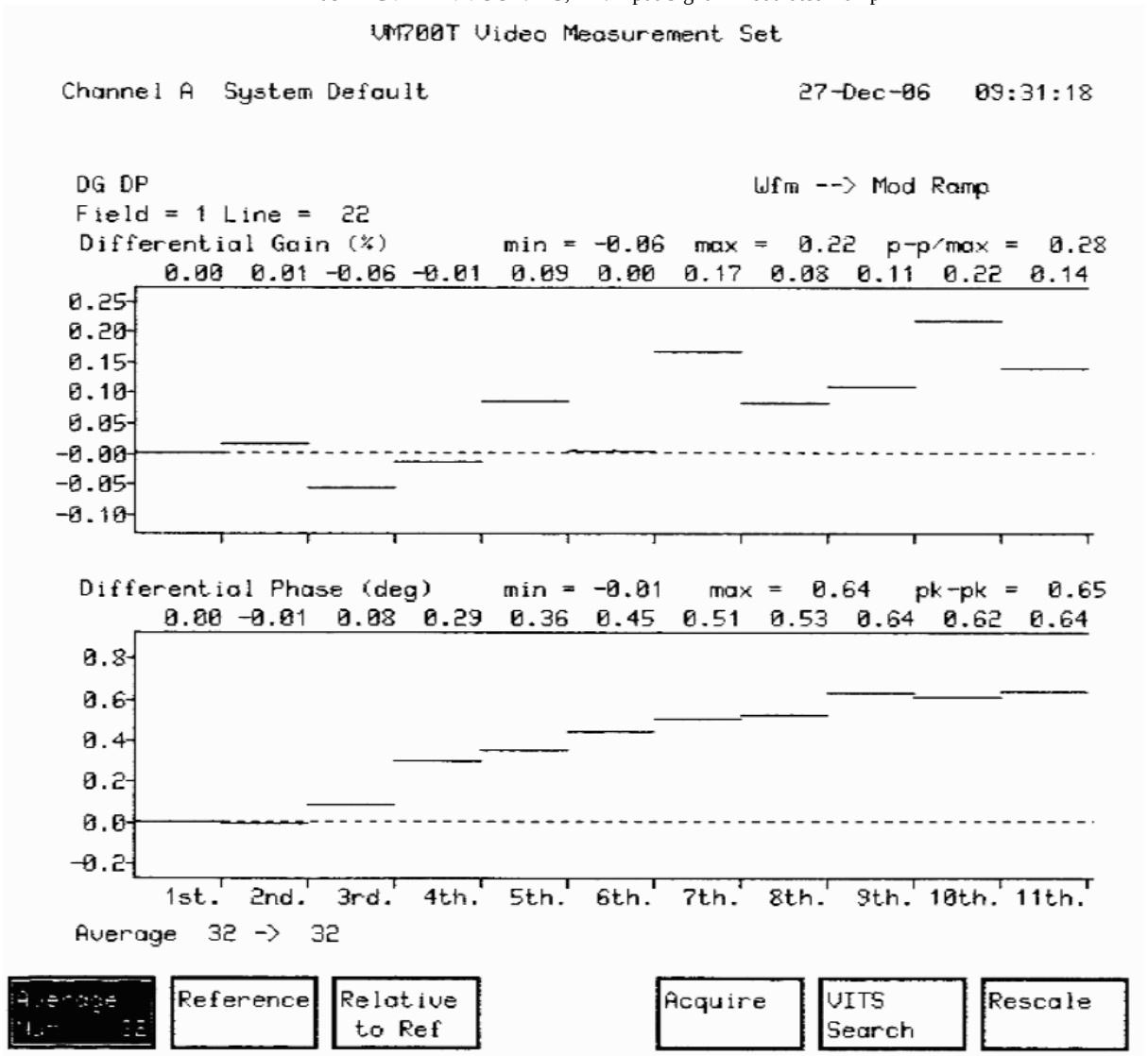


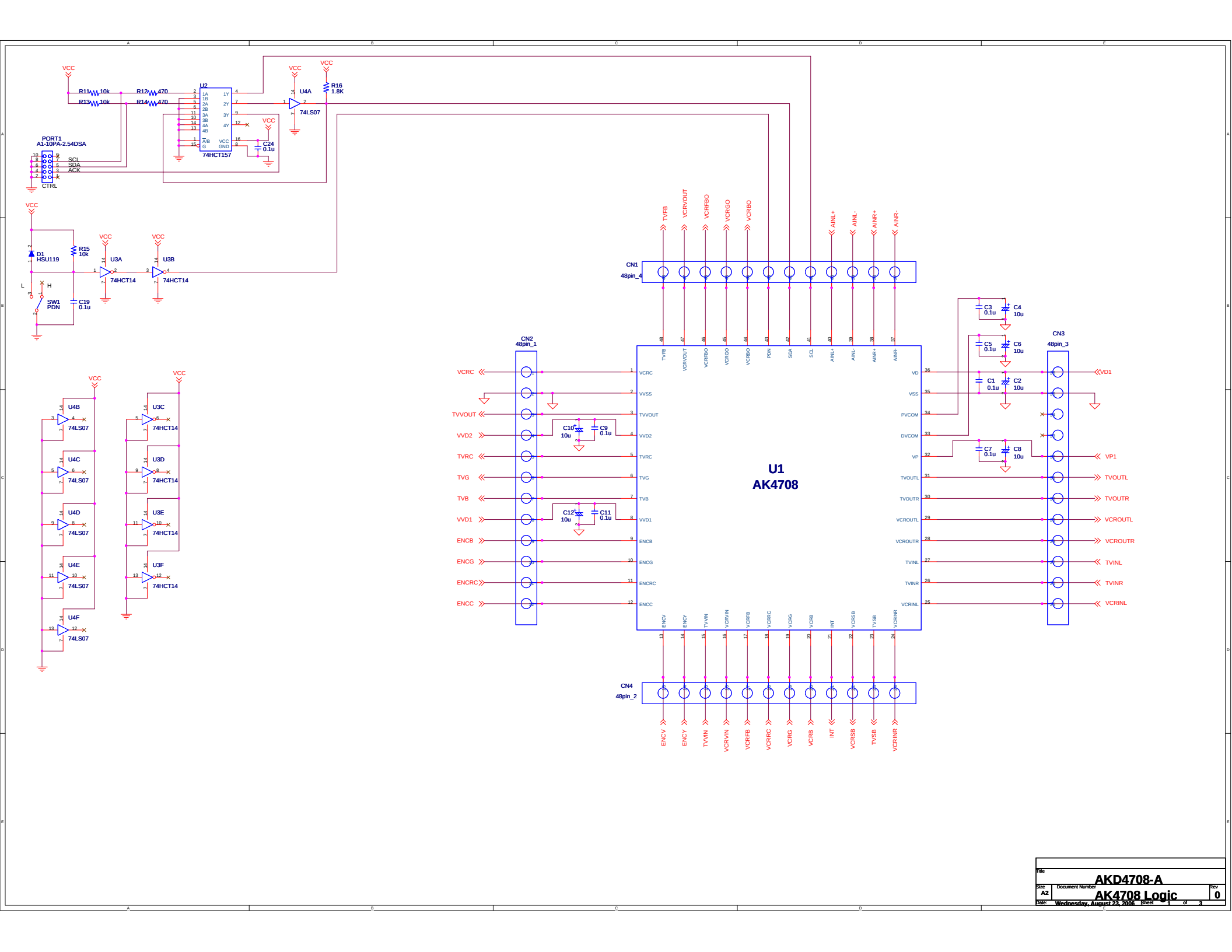
Figure 2-3 DG, DP (Input Signal= Modulated Lamp)

Revision History

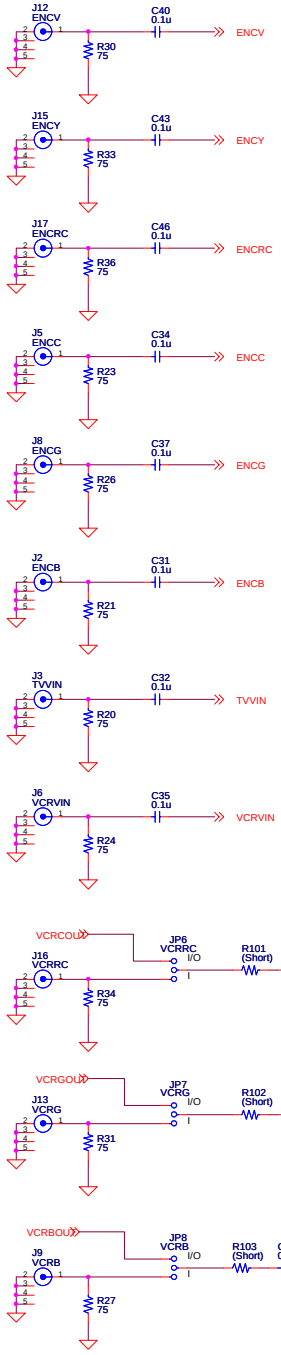
Date (YY/MM/DD)	Manual Revision	Board Revision	Reason	Contents
06/09/30	KM085100	0	First Edition	
07/01/09	KM085101	0	Add Measurement Results	Add Table Data, Plot Data

IMPORTANT NOTICE

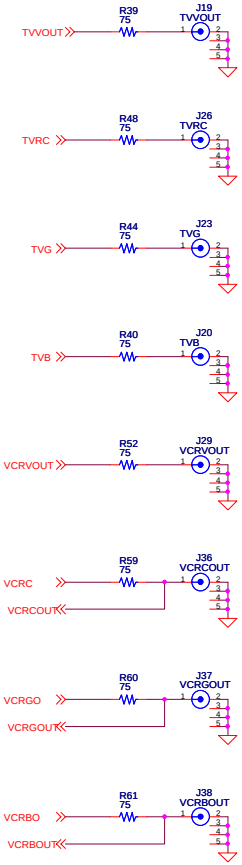
- These products and their specifications are subject to change without notice. Before considering any use or application, consult the Asahi Kasei Microsystems Co., Ltd. (AKM) sales office or authorized distributor concerning their current status.
- AKM assumes no liability for infringement of any patent, intellectual property, or other right in the application or use of any information contained herein.
- Any export of these products, or devices or systems containing them, may require an export license or other official approval under the law and regulations of the country of export pertaining to customs and tariffs, currency exchange, or strategic materials.
- AKM products are neither intended nor authorized for use as critical components in any safety, life support, or other hazard related device or system, and AKM assumes no responsibility relating to any such use, except with the express written consent of the Representative Director of AKM. As used here:
  (a) A hazard related device or system is one designed or intended for life support or maintenance of safety or for applications in medicine, aerospace, nuclear energy, or other fields, in which its failure to function or perform may reasonably be expected to result in loss of life or in significant injury or damage to person or property.
  (b) A critical component is one whose failure to function or perform may reasonably be expected to result, whether directly or indirectly, in the loss of the safety or effectiveness of the device or system containing it, and which must therefore meet very high standards of performance and reliability.
- It is the responsibility of the buyer or distributor of an AKM product who distributes, disposes of, or otherwise places the product with a third party to notify that party in advance of the above content and conditions, and the buyer or distributor agrees to assume any and all responsibility and liability for and hold AKM harmless from any and all claims arising from the use of said product in the absence of such notification.


U1
AK4708
CN1
48pin_4
CN2
48pin_1
CN3
48pin_3
CN4
48pin_2
U2
74HCT157
U4A
74LS07
U3A
U3B
74HCT14
U4B
U4C
U4D
U4E
U4F
U3C
U3D
U3E
U3F
PORT1
A1-10PA-2.54DSA
CTRL
SCL
SDA
ACK
D1
HSU119
SW1
PDN
R11 10k
R12 470
R13 10k
R14 470
R15 10k
R16 1.8K
C24 0.1u
C19 0.1u
C1 0.1u
C2 10u
C3 0.1u
C4 10u
C5 0.1u
C6 10u
C7 0.1u
C8 10u
C9 0.1u
C10 10u
C11 0.1u
C12 10u
VCC
TVFB
VCRVOUT
VCRFBO
VCRGO
VCRBO
AINL+
AINL-
AINR+
AINR-
VCRC
VVSS
TVVOUT
VVD2
TVRC
TVG
TVB
VVD1
ENCB
ENCG
ENCRC
ENCC
VD
VSS
PVCOM
DVCOM
VP
TVOUTL
TVOUTR
VCROUTL
VCROUTR
TVINL
TVINR
VCRINL
ENCV
TVVIN
VCRVIN
VCRFB
VCRRC
VCRG
VCRB
INT
VCRSB
TVSB
VCRINR
VD1
VP1
TVOUTL
TVOUTR
VCROUTL
VCROUTR
TVINL
TVINR
VCRINL
Title
AKD4708-A
Size
A2
Document Number
AK4708 Logic
Rev
0
Date:
Wednesday, August 23, 2006
Sheet
1
of
3

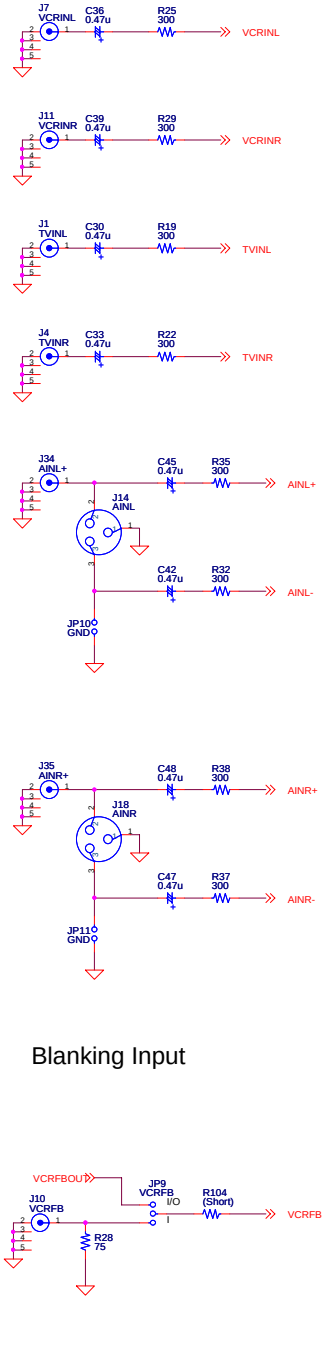
Video Intput



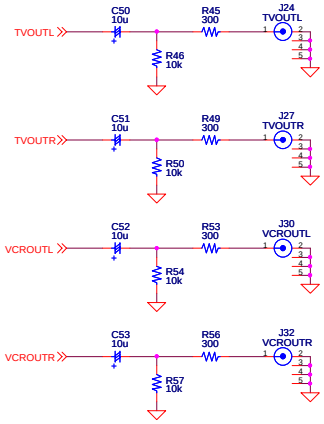
Video Output



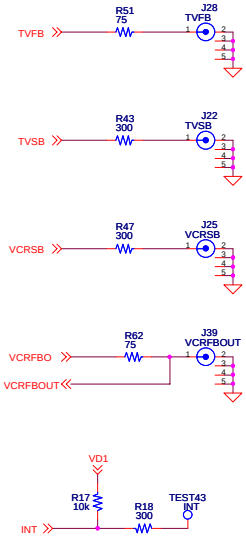
Audio Intput



Audio Output

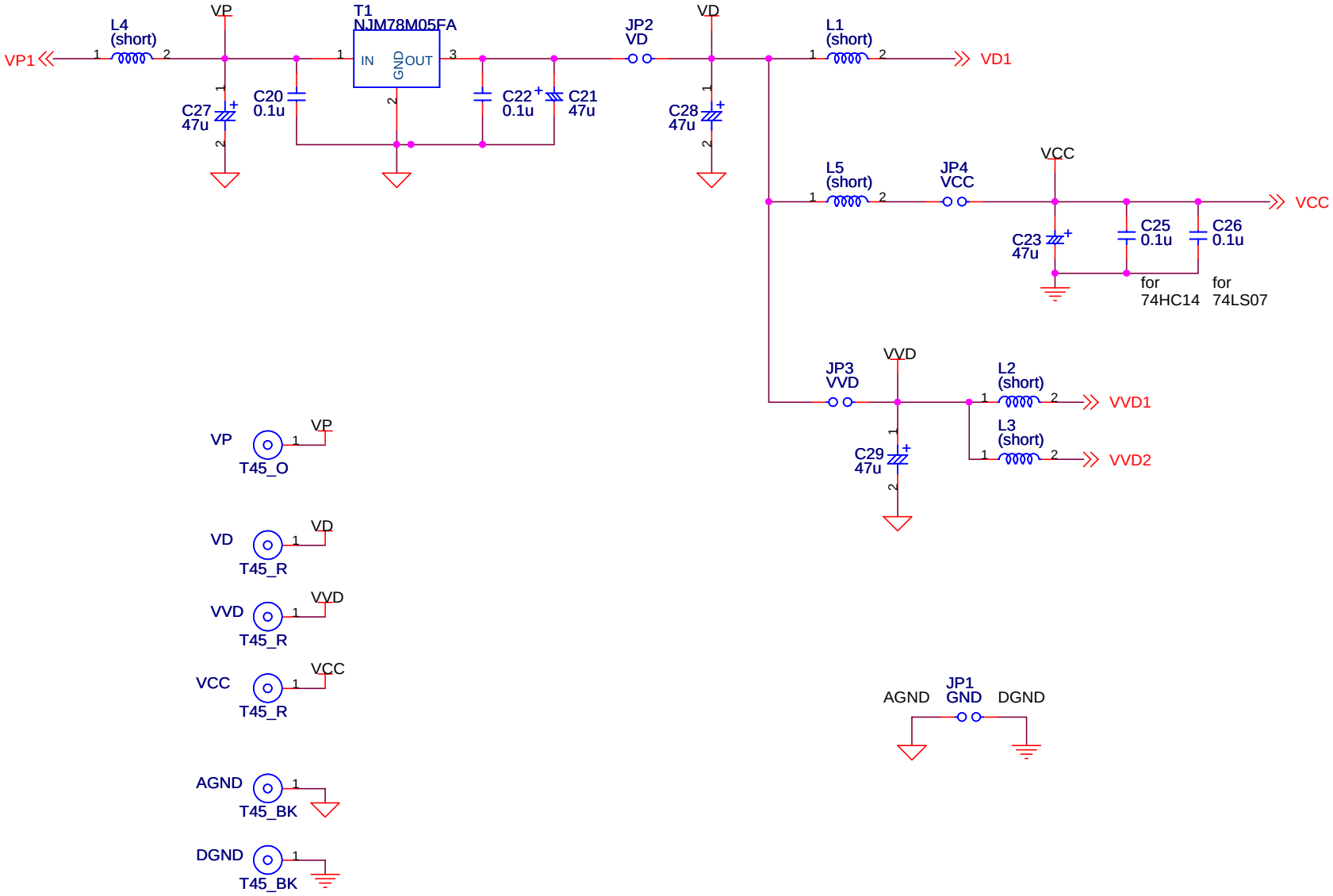


Blanking Output

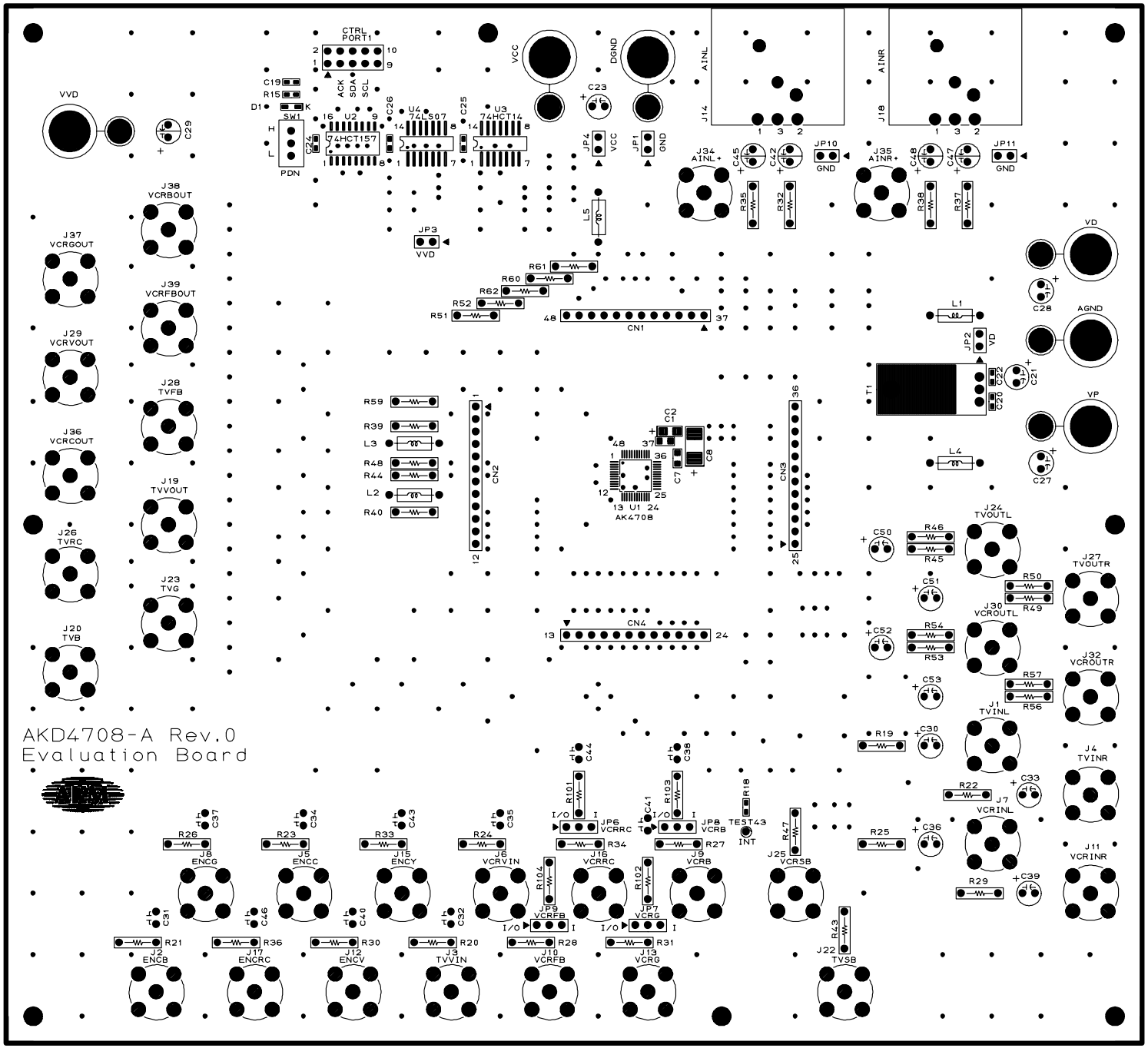


Blanking Input

Title: AKD4708-A		
Size: A2	Document Number: Audio Video Input Output	Rev: 0
Date: Wednesday, August 23, 2006	Sheet 2 of 3	

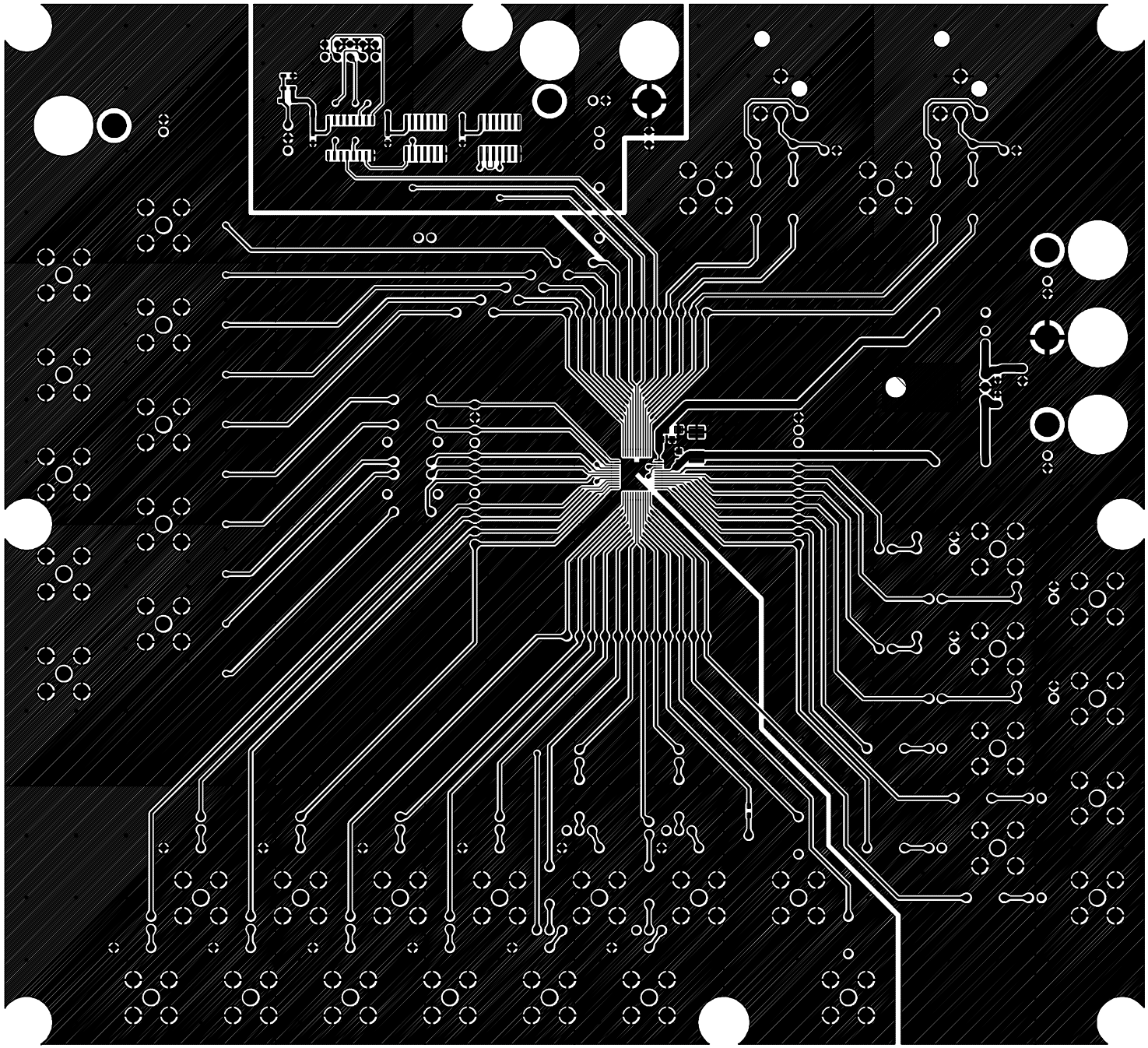


Title	AKD4708-A	
Size: A4	Document Number: Power Supply	Rev: 0
Date: Wednesday, August 23, 2006	Sheet 3 of 3	



AKD4708-A L1 SILK

AKD4708-A L2 SILK



AKD4708-A L1

AKD4708-A L2